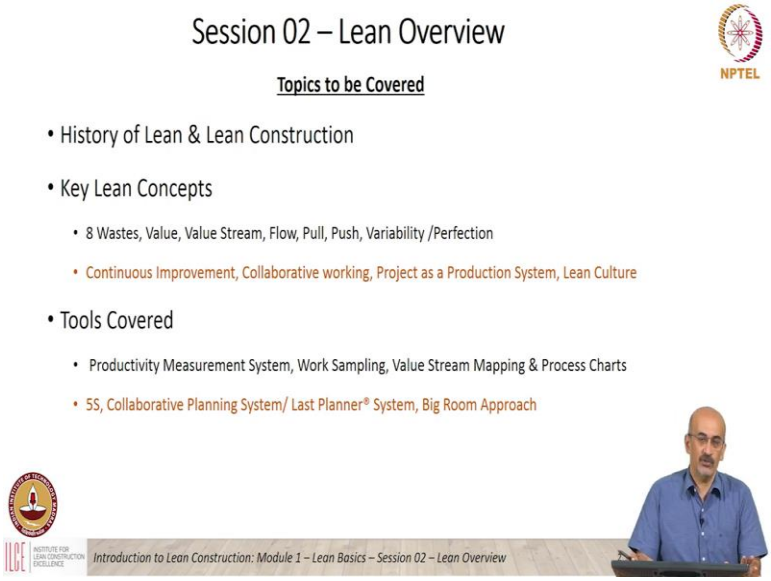
Introduction to Lean Construction
Professor Koshy Varghese
Department of Civil Engineering
Indian Institute of Technology, Madras
Module 1, Lecture 6
History of Lean and other Management Philosophies;
Toyota Production System (TPS); What is Lean?

Hello everyone, welcome to the second session. In this section we will give an overview of lean.

(Refer Slide Time: 00:29)

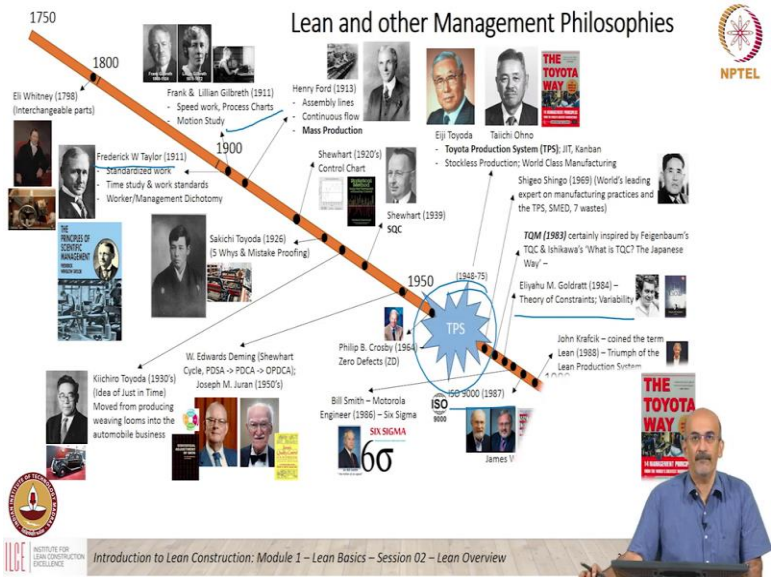


And these are the topics to be covered. First session, we will talk a little bit about history of lean and lean construction, and then move on to key lean concepts where we will cover, What is waste? Things like value, value stream, push, pull variability, which are the classic concepts in lean.

We will then Professor Raghavan will talk a little bit about continuous improvement, collaborative working, project as a production system, and lean culture as also important concepts in the practice of lean specifically also with respect to the construction and lean construction requirements. We will then go on to cover in this module.

I will cover the tools of productivity measurement systems,, work sampling, value stream mapping, and process charts, Professor Raghavan will cover and over give you an overview of 5S, collaborative planning or the last planner system and the big room approach.

(Refer Slide Time: 01:26)



Starting with the history, if we look at lean and other management philosophies, there is a timeline on which this is occurred. Now, we are aware the Toyota Production System form the basis for lean and lean concepts. And the TPS was had its initiation between the 50s and 60s in Japan.

Now, if we go back in time the first kind of documented aspects of management is when Whitney is credited with the use of interchangeable parts for muskets. So, it said that he had a contract to produce a large number of muskets for the US government. And by using interchangeable parts, he made the productivity much better.

So, Whitney, incidentally is also the person who brought in automation for cotton processing. Now, as we go move past that period, there is a period in which a lot of formal management signs started evolving. Frederick Taylor, who we see here is credited as the father of management science.

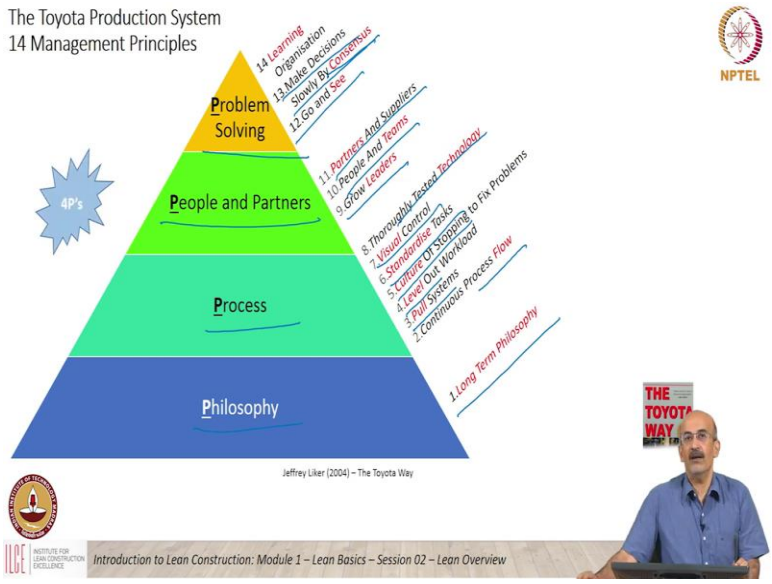
And you can see several of the terms he used, whether it is standardized work, or time studies, all of this are also relevant today. But it is actually Frank and Lillian Gilbreth, who made this standardized of motion study and process charts, what was very scientifically done in as earliest 1911. Since then, there has been a lot of evolution.

And you would say that kind of, whether we look at Henry Ford in the assembly lines, and when we look at lean, we look at the start of the total quality management or the statistical quality control, whether it was Deming or whether it was Shewhart before Deming, or whether it was people like Taiichi, all of them started bringing this in a formal way into production systems.

And in many ways, it led to the development of what Toyota viewed as the Toyota Production System. And as we move we have definitely further moving further along. We had things like theory of constraints coming from Goldratt, TQM, being formalized, the ISO 9000 standards. And as we came into the 90s, this is when lean started getting formalized.

The term lean start was coined at MIT, and this book, machines that changed the world by Womack and John became very popular and lean thinking started propagating from there, based on the Toyota Production System very very strongly based on the Toyota Production System, but lean and its terminologies started taking root from the late 1980s to 1990s and onward. And as we go forward, there is definitely progress and it continues to progress the way we think the way we bring in new tools, the way we automate, but concepts generally have remained the same.

(Refer Slide Time: 04:25)



Now, when we take go back to the Toyota Production System, if any reference material will talk about the 14 management principles, which were propagated by the Toyota way, and if we look these management principles are classified as 4P's that is philosophy, process, people and partners and problem solving.

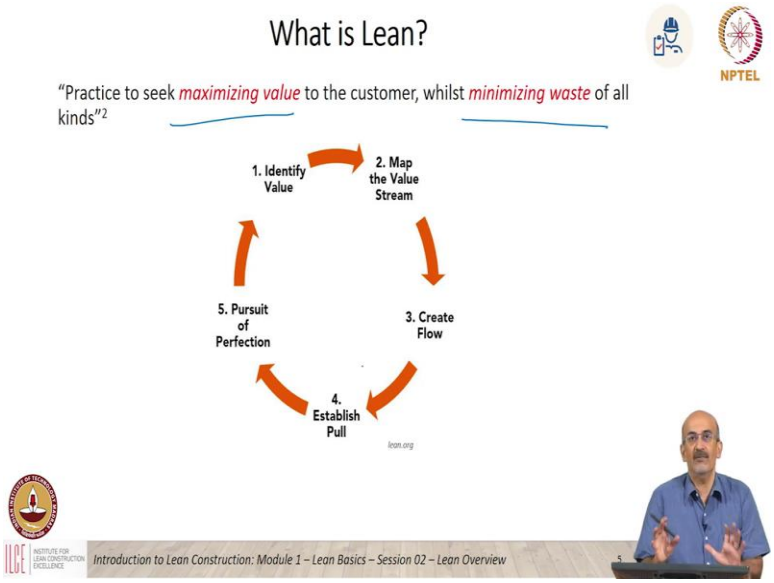
And the 14 principles are classified in these categories. And the first principle of philosophy basically says you need a long-term philosophy. Lean is not about the short term, it is about long term, even the TPS, nothing is a quick fix. You need to think about it you need to implement you need to measure you need to expect benefits in the long term, when we look at process, these are the other principles on process we talk about flow which we will cover again in this course, we talk about pull systems, leveling the workload, the culture to stop and fix problems, which is also very important and sometimes very challenging to do in a regular organization, the need to standardize tasks have visual controls, which is very relevant in construction and use thoroughly tested technologies.

So, these are part of the process elements of the Toyota Production System. When we go to people, the people issue is also extremely important talks about growing leaders, development people in team, developing partners and suppliers. And these are also very very core elements which make an organization successful.

And finally, we are the problem solving, where we say whether it is, the go and see or the Gemba as we call it, go see for yourself. Then make decision by consensus, and the Japanese, the way the Toyota production systems it is slowly by consensus, but it is a consensus that is important.

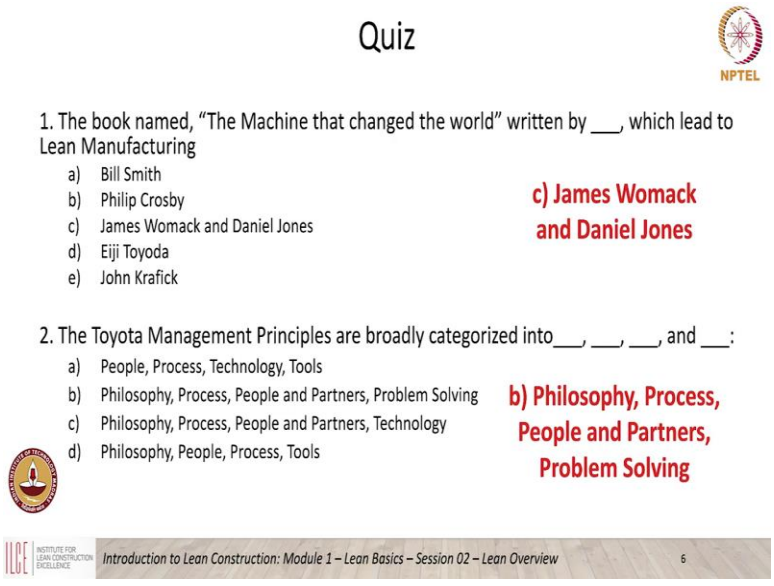
And then be a learning organization which is the ultimate objective be a constantly innovation, innovating organization keep looking at ways to improve, be let the improvement requirement, not come just from the top management, but from everybody in the organization. That is what is a learning organization. So, while these 14 management principles form, the basis of lean.

(Refer Slide Time: 06:42)



When Womack and John wrote their book, they actually simplified lean into the these core 5 principles, which were identify value, map value stream, create flow, establish pull and pursuit of perfection. So, in many ways, we will look at these principles and kind of take our concepts and tools we are learning around this. Now, in addition to this, we have to understand that if you wanted a definition for lean, it is basically to maximize value while minimizing waste. So, while the principles here do not explicitly talk about waste, minimizing waste is embedded in all of these.

(Refer Slide Time: 07:30)



Supplementary Module

Link (to read and contribute)

https://tinyurl.com/yfmkc8ba

Topics to be Covered Slide